

REMARKS

Claims 1-5, 12, 14-20, 24, 28, 39, 40, 45, and 46 are pending.

The invention generally addresses a problem that can occur in lithium batteries, for example, primary lithium batteries. The cathode active material, for example, MnO₂, can include structural water that cannot be removed fully with even vigorous drying. That structural water can cause the corrosion of the cathode current collector, which is made of a metal such as aluminum. The corrosion can occur, for example, at the couple between an aluminum current collector and a steel positive lead. See the discussion on page 1, line 22 - page 2, line 2 of the specification.

Applicants discovered that this type of corrosion can be suppressed by including a bis(oxalato)borate salt in the electrolyte. Surprisingly, applicants discovered that even small quantities (less than 0.1. M) of the bis(oxalato)borate salt can suppress corrosion. See the results presented on pages 9-12 of the specification.

The claims as amended require that the bis(oxalato)borate salt is present in the electrolyte at a concentration of less than 0.1 M. Independent claim 45 also requires that the cathode includes only MnO₂ as the active cathode material.

As applicants discussed above, the claims as amended require that the electrolyte include a bis(oxalato)borate salt at a concentration of less than 0.1 M. The Examiner seems confused as to whether these claims can cover electrolytes including no bis(oxalato)borate salt because “zero” is less than 0.1 M.

The claims do not cover an electrolyte including no bis(oxalato) borate salt. The independent claims explicitly state “an electrolyte containing a bis(oxalato)borate salt.” An electrolyte containing no bis(oxalato)borate salt does not include a bis(oxalato)borate salt. The 0.1 M limitation simply provides an upper limit on the quantity of bis(oxalato)borate salt in the electrolyte. But the electrolyte still must include some bis(oxalato)borate salt (at a concentration of less than 0.1M) to be within the claims.

Claims 1-5, 12, 17-20, 24, 28, 39, 40, 45, and 46 have been rejected under 35 U.S.C. § 102(b) as anticipated by Miyaki et al., 2002/0114993 (“Miyaki”). But as the Examiner recognizes, Miyaki does not disclose an electrolyte containing a bis(oxalato)borate salt. The

claims require an electrolyte containing a bis(oxalato)borate salt, and thus are novel in view of Miyaki. Applicants request that the rejection be withdrawn for this reason.

Claims 1-5, 12, 17-20, 28, 39, 40, 45, and 46 were rejected under 35 U.S.C. § 103(a) as obvious over Miyaki in view of Wietelmann et al., U.S. Pat. 6,506,516 ("Wietelmann"). Each of these claims now requires that the electrolyte contain less than 0.1 M of the bis(oxalato)borate salt. That requirement previously was present in dependent claims 11, 23, and 42, which were not rejected under 35 U.S.C. § 103(a) in view of the combination of Miyaki and Wietelmann. Applicants agree that Miyaki and Wietelmann do not suggest an electrolyte containing less than 0.1 M of a bis(oxalato)borate salt. Therefore, applicants request that the 35 U.S.C. § 103(a) rejection of claims 1-5, 12, 17-20, 28, 39, 40, 45, and 46 based on Miyaki and Wietelmann be withdrawn.

Claims 1-5, 17-20, 28, 39, 40, 45, and 46 also were rejected under 35 U.S.C. § 103(a) as obvious over Miyaki in view of Jow et al., U.S. 7,172,834 ("Jow"). Each of these claims now requires that the electrolyte contain less than 0.1 M of the bis(oxalato)borate salt. That requirement previously was present in dependent claims 11, 23, and 42, which were not rejected under 35 U.S.C. § 103(a) in view of the combination of Miyaki and Jow. Applicants agree that Miyaki and Jow do not suggest an electrolyte containing less than 0.1 M of a bis(oxalato)borate salt. Therefore, applicants request that the 35 U.S.C. § 103(a) rejection of claims 1-5, 12, 17-20, 28, 39, 40, 45, and 46 based on Miyaki and Jow be withdrawn for at least this reason.

Moreover, Jow was filed on July 24, 2004, and claims priority to a provisional application filed on July 29, 2002. The Fourth Declaration of Dana Alexa Totir, Kirakodu S. Nanjundaswamy and Michael Pozin Under 37 C.F.R. § 1.131. establishes that electrochemical cells covered by the pending claims were made and used by applicants in the United States (see paragraph 1) prior to July 29, 2002. The Fourth Declaration includes the same laboratory notebook pages (with dates whited out) relied on in the Second Declaration of Dana Alexa Totir, Kirakodu S. Nanjundaswamy and Michael Pozin Under 37 C.F.R. § 1.131. For the convenience of the Examiner, paragraph 3 of the Declaration is quoted below:

3. The laboratory notebook pages demonstrate that electrochemical cells covered by claims 1-5, 8-12, 14-24, 28, 31-35, and 39-43, and 45-46 were made and used prior to July 29, 2002.

(a) Some of the information on the notebook pages is highlighted for convenience. See in particular the highlighted information next to "Cell #1" on page 2489-110 and "Cell #2" on page 2489-111. The electrochemical cells were coin cell models that included a plastic housing, a cathode including " β -EMD" (β -electrolytic manganese dioxide) on a "primed Al" (aluminum) current collector. The aluminum current collector in turn was pressed on an "SS grid". SS is stainless steel, and the aluminum current collector thus was in contact with a second metal surface (the stainless steel) different from the surface of the aluminum current collector. The cells included a "Li" (lithium) anode and an electrolyte including "0.05 M" (page 2489-110) or "0.03 M" (page 2489-111) LiBOB." LiBOB is lithium bis(oxalato)borate. Thus, the electrochemical cells described on laboratory notebook pages 2489-110 and 2489-111 include all of the requirements of claims 1-2, 5, 8-12, 31-35, and 45-46.

(b) Laboratory notebook pages 2489-110 and 2489-111 refer to "LiBOB in TDE10" in the highlighted information next to "Cell #1" and "Cell #2". TDE10 is an internal name for an electrolyte that includes, among other ingredients, lithium trifluoromethanesulfonate. Thus, electrochemical cells on laboratory notebook pages 2489-110 and 2489-111 also include all of the requirements of claims 3 and 4.

(c) The aluminum cathode current collector used in the electrochemical cells on laboratory notebook pages 2489-110 and 2489-111 had a size of at least one dimension greater than 2 millimeters. Thus, the electrochemical cells on laboratory notebook pages 2489-110 and 2489-111 include all of the requirements of claims 14-16.

(d) The electrochemical cells on laboratory notebook pages 2489-110 and 2489-111 were designed to be discharged once and then discarded, and thus are primary electrochemical cells as opposed to secondary (rechargeable) electrochemical cells. Thus, the electrochemical cells on laboratory notebook pages 2489-110 and 2489-111 meet all of the requirements of claims 17-24, 28, and 39-43.

Thus, Jow does not qualify as prior art to the pending claims under 35 U.S.C. § 102(e) or any other statutory provision. Therefore, applicants request that the 35 U.S.C. § 103(a) rejection of claims 1-5, 12, 17-20, 28, 39, 40, 45, and 46 based on Miyaki and Jow be withdrawn for this additional reason.

Claims 1-5, 17-20, 28, 39, 40, 45, and 46 were rejected under 35 U.S.C. § 103(a) as obvious over Miyaki in view of DE 10049097 ("DE '097"). Each of these claims now requires that the electrolyte contain less than 0.1 M of the bis(oxalato)borate salt. That requirement

previously was present in dependent claims 11, 23, and 42, which were not rejected under 35 U.S.C. § 103(a) in view of the combination of Miyaki and DE '097. Applicants agree that Miyaki and DE '097 do not suggest an electrolyte containing less than 0.1 M of a bis(oxalato)borate salt. Therefore, applicants request that the 35 U.S.C. § 103(a) rejection of claims 1-5, 17-20, 28, 39, 40, 45, and 46 based on Miyaki and DE '097 be withdrawn.

Claims 11, 12, 23, 24, and 42 were rejected under 35 U.S.C. § 103(a) over the combination of Miyaki and Wietelmann, and/or Miyaki and Jow, and/or Miyaki and DE '097, and further in view of Amine et al., 2005/0019670 ("Amine"). Claims 11, 23, and 42 have been cancelled but the less than 0.1 M requirement originally in claims 11, 23, and 42 has been incorporated into independent claims 1, 17, 39, and 45.

Amine was filed on May 28, 2004, and claims priority to a provisional application filed on July 18, 2003. The previously submitted and discussed Third Declaration of Dana Alexa Totir, Kirakodu S. Nanjundaswamy and Michael Pozin Under 37 C.F.R. § 1.131 establishes that electrochemical cells covered by the pending claims were made and used by applicants in the United States prior to July 29, 2002. Thus, Amine does not qualify as prior art to the claims under 35 U.S.C. § 102(e) or any other statutory provision. Therefore, the 35 U.S.C. § 103(a) rejections of claims 12 and 24 based in part on Amine should be withdrawn.

Claims 14-16 were rejected under 35 U.S.C. § 103(a) over the combination of Miyaki and Wietelmann, and/or Miyaki and Jow, and/or Miyaki and DE '097, and further in view of Krause et al., U.S. 5,691,081. Applicants submit that these rejections are moot in view of the amendment of the independent claims to require an electrolyte containing less than 0.1 M of a bis(oxalato)borate salt. Therefore, applicants request that the 35 U.S.C. § 103(a) rejections of claims 14-16 be withdrawn.

Applicants submit that the claims are in condition for allowance and such action is respectfully requested.

Please apply any other charges or credits to deposit account 06-1050.

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Respectfully submitted,

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